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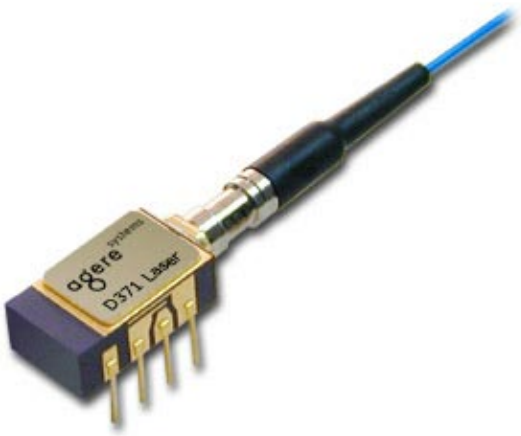
Data Sheet
January 1999

D371-Type Digital Uncooled DFB Laser Module



The low-profile D371-Type Laser Module is ideally suited for short- and long-haul SONET and other high-speed digital applications.

Features

- Eight-pin package suitable for SONET applications
- Narrow linewidth, distributed-feedback, multiquantum-well (DFB-MQW) 1.3 µm laser with single-mode fiber pigtail
- Wide operating temperature range: –40 °C to +85 °C
- No TEC required
- High output power: typical 2.0 mW peak power coupled into single-mode fiber
- Hermetically sealed active components
- Internal back-facet monitor
- Qualification program: *Telcordia Technologies** TA-983

* *Telcordia Technologies* is a registered trademark of Telcordia Technologies, Inc.

Applications

- Long-reach SONET OC-3/OC-12 systems
- Telecommunications
- Secure digital data systems

Benefits

- Easily board mounted
- Requires no lead bending
- No additional heat sinks required
- Pin compatible with industry-standard, 14-pin laser module
- Highly efficient DFB-MQW laser structure allows for lower threshold and drive currents, and reduced power consumption

Description

The D371-Type Uncooled Laser Module consists of a laser diode coupled to a single-mode fiber pigtail. The device is available in a standard, 8-pin configuration (see Figure 1 and/or Table 1) and is ideal for long-reach (SONET) and other high-speed digital applications.

The laser diode is a narrow linewidth (<1 nm) DFB-MQW single-mode laser and an InGaAs PIN photodiode back-facet monitor in an epoxy-free, hermetically sealed package.

Description (continued)

The device characteristics listed in this document are met at 2.0 mW output power. Higher- or lower-power operation is possible. Under conditions of a fixed photodiode current, the change in optical output is typically ±0.5 dB over an operating temperature range of –40 °C to +85 °C.

This device incorporates the new Laser 2000 manufacturing process developed by the Optoelectronic unit of Agere Systems Inc. Laser 2000 is a low-cost platform that targets high-volume manufacturing and tighter product distributions on all optical subassemblies. The platform incorporates an advanced optical design that is produced on a highly automated production line. The Laser 2000 platform is qualified for the central office and uncontrolled environments, and can be used for applications requiring high performance and low cost.

Table 1. Pin Descriptions

Pin Number	Connection
1	NC/reserved
2	Case ground
3	NC/reserved
4	Photodiode cathode
5	Photodiode anode
6	Laser diode cathode
7	Laser diode anode
8	NC/reserved

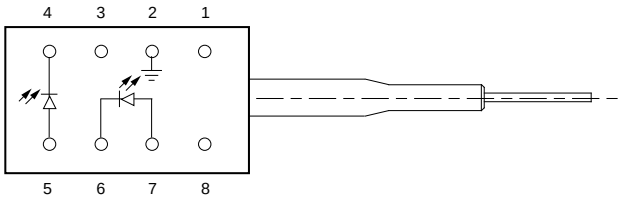


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Figure 1. D371-Type Digital Uncooled DFB Laser Module Schematic, Top View

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Min	Max	Unit
Maximum Peak Laser Drive Current or Maximum Fiber Power*	I_{OP} P_{MAX}	— —	150 10	mA mW
Peak Reverse Laser Voltage: Laser Monitor	 V_{RL} V_{RD}	 — —	 2 20	 V V
Monitor Forward Current	I_{FD}	—	2	mA
Operating Case Temperature Range	T_C	–40	85	°C
Storage Case Temperature Range	T_{stg}	–40	85	°C
Lead Soldering Temperature/Time	—	—	260/10	°C/s
Relative Humidity (noncondensing)	RH	—	85	%

* Rating varies with temperature.

Handling Precautions

Caution: This device is susceptible to damage as a result of electrostatic discharge (ESD). Take proper precautions during both handling and testing. Follow guidelines such as JEDEC Publication No. 108-A (Dec. 1988).

Although protection circuitry is designed into the device, take proper precautions to avoid exposure to ESD.

Electro/Optical Characteristics

Table 2. Electro/Optical Characteristics (over operating temperature range unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Operating Temperature Range	T	—	–40	—	85	°C
Optical Output Power*	P_F	CW, nominal	—	2	—	mW
Threshold Current	I_{TH}	T = 25 °C T = full range	4 2	11 —	15 50	mA mA
Modulation Current	I_{MOD}	CW, P_F = 2.0 mW, T = 25 °C CW, I_{MON} = const. T = full range	10 7.5	20 —	30 55	mA
Slope Efficiency†	SE	CW, P_F = 2.0 mW, T = 25 °C	67	—	200	µW/mA
Center Wavelength	λ_C	P_F = 2.0 mW, CW	1280	—	1335	nm
Spectral Width (–20 dB)	$\Delta\lambda$	P_F = 2.0 mW, 622 Mbits/s	—	—	1	nm
Side-mode Suppression Ratio	SMSR	CW, P_F = 2.0 mW	30	40	—	dB
Tracking Error	TE	I_{MON} = constant, CW	—	0.5	—	dB
Spontaneous Emission	P_{TH}	I = (0.9) I_{TH}	—	—	50	µW
Rise/Fall Times	t_R, t_F	10%—90% pulse T = 25 °C	—	0.25	0.5	ns
Forward Voltage	V_F	CW	—	1.1	1.6	V
Input Impedance	R	—	3	—	8	Ω
Monitor Current	I_{MON}	V_R‡ = 5 V	50	—	1000	µA
Monitor Dark Current	I_D	V_R‡ = 5 V	—	10	200	nA
Wavelength Temperature Coefficient	—	—	—	0.09	0.1	nm/°C

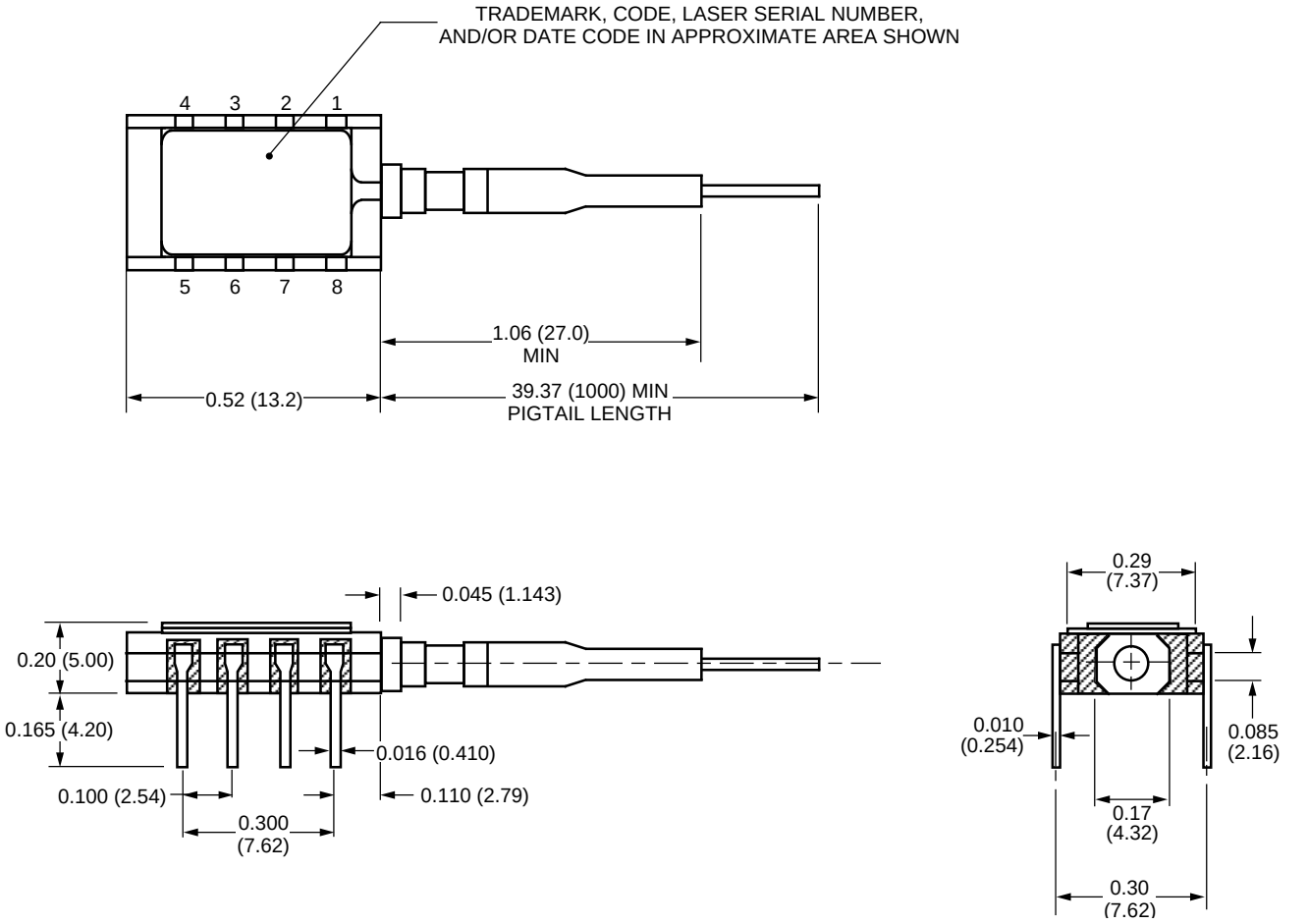
* 1 mW power option also available. See Table 4 for more information.

† The slope efficiency is used to calculate the modulation current for a desired output power. This modulation current plus the threshold current comprise the total operating current for the device.

‡ V_R = reverse voltage.

Outline Diagram

Dimensions are in inches and (millimeters).



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Qualification Information

The D371-Type Laser Module has completed and passed the following qualification tests and meets the intent of Bellcore TR-NWT-000468 for interoffice environments and TA-TSY-000983 for outside plant environments.

Table 3. D371-Type Laser Module Qualification Test Plan

Qualification Test	Conditions	Sample Size	Reference
Mechanical Shock	500 G for P/F 1,500 G for information	11	MIL-STD-883 Method 2002
Vibration	20 g, 20 Hz—2,000 Hz	11	MIL-STD-883 Method 2007
Solderability	—	11	MIL-STD-883 Method 2007
Thermal Shock	Delta T = 100 °C	11	MIL-STD-883 Method 2003
Fiber Pull	1 kg; 3 times for P/F 2 kg; 3 times for information	11	*Telcordia Technologies* 983
Accelerated (Biased) Aging	85 °C, 5,000 hrs.	25	*Telcordia Technologies* 983 Section 5.18
85 °C Storage	1,000 hrs. for provisional qual. 2,000 hrs. for P/F 5,000 hrs. for information	11	*Telcordia Technologies* 983
Temperature Cycling	500 cycles for P/F 1,000 cycles for information	11	*Telcordia Technologies* 983 Section 5.20
Cyclic Moisture Resistance	10 cycles for P/F 20 cycles for information	11	*Telcordia Technologies* 983 Section 5.23
Damp Heat	40 °C, 95% RH 1,000 hrs. for provisional qual. 1,344 hrs. for P/F	11	MIL-STD-202 Method 103
Internal Moisture	<5,000 ppm water vapor	11	MIL-STD-883 Method 1018
Flammability	—	—	TR357 Sec. 4.4.2.5
ESD Threshold	—	6	*Telcordia Technologies* 983 Section 5.22

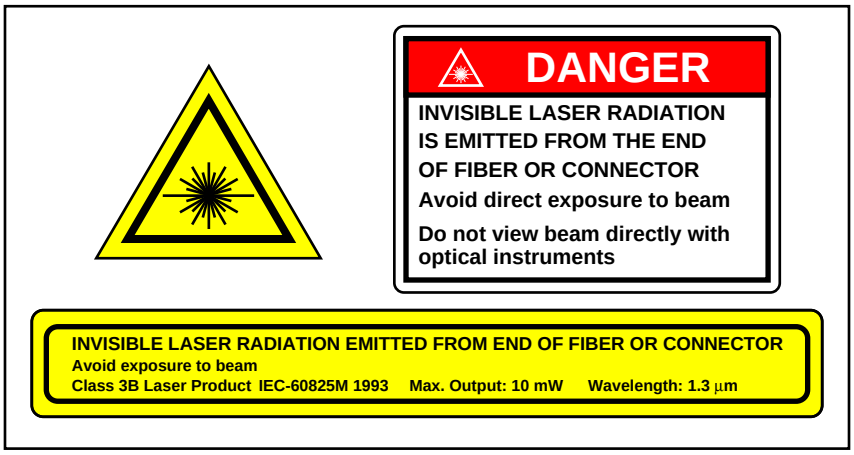
Laser Safety Information

Class IIIb Laser Product

FDA/CDRH Class IIIb laser product. All versions are Class IIIb laser products per CDRH, 21 CFR 1040 Laser Safety requirements. All versions are Class 3B laser products per *IEC** 60825-1:1993. The device has been classified with the FDA under accession number 8720010.

This product complies with 21 CFR 1040.10 and 1040.11.
8.3 µm single-mode pigtail with optional connector.
Wavelength = 1.3 µm.
Maximum power = 10 mW.
Because of size constraints, laser safety labeling is not affixed to the module but attached to the outside of the shipping carton.
Product is not shipped with power supply.

Caution: Use of controls, adjustments, and procedures other than those specified herein may result in hazardous laser radiation exposure.


DANGER
INVISIBLE LASER RADIATION
IS EMITTED FROM THE END
OF FIBER OR CONNECTOR
Avoid direct exposure to beam
Do not view beam directly with optical instruments
INVISIBLE LASER RADIATION EMITTED FROM END OF FIBER OR CONNECTOR
Avoid exposure to beam
Class 3B Laser Product IEC-60825M 1993 Max. Output: 10 mW Wavelength: 1.3 µm

* *IEC* is a registered trademark of The International Electrotechnical Commission.

Ordering Information

Table 4. Ordering Information

Device Code	Comcode	Operating Case Temperature Range (°C)	Pfiber	Connector
D371-10A	107950941	–40 to +85	1.0 mW	SC-PC
D371-20A	107950958	–40 to +85	2.0 mW	SC-PC
D371-22A	108286527	0 to 65	2.0 mW	SC-PC
D371-20B	108225376	–40 to +85	2.0 mW	SC-APC
D371-10F	107950982	–40 to +85	1.0 mW	FC-PC
D371-20F	107950990	–40 to +85	2.0 mW	FC-PC
D371-22F	108286535	0 to 65	2.0 mW	FC-PC
D371-10N	107951006	–40 to +85	1.0 mW	none
D371-20N	107951014	–40 to +85	2.0 mW	none
D371-22N	108288382	0 to 65	2.0 mW	none

For additional information, contact your Agere Systems Account Manager or the following:
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